# United States Patent [19]

**McPhee**

[11] **3,880,311**

[45] **Apr. 29, 1975**


[54] **COLLAPSIBLE MEDICAL LIQUID BOTTLE WITH CALIBRATION AND LABEL ORIENTING HANGER STRUCTURE**


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[73] Assignee: **American Hospital Supply Corporation,** Evanston, Ill.



[22] Filed: **Feb. 26, 1974**

[21] Appl. No.: **445,851**

[52] **U.S. Cl.** ..... **215/7;** 128/214 C; 215/100 A

[51] **Int. Cl.** ..... **B65d 23/10**

[58] **Field of Search** ..... 215/7, 8, 100 A, 100 R, 215/307; 150/.5; 128/214 C, 214 D; 222/105



[56] **References Cited**

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*Primary Examiner*—Donald F. Norton

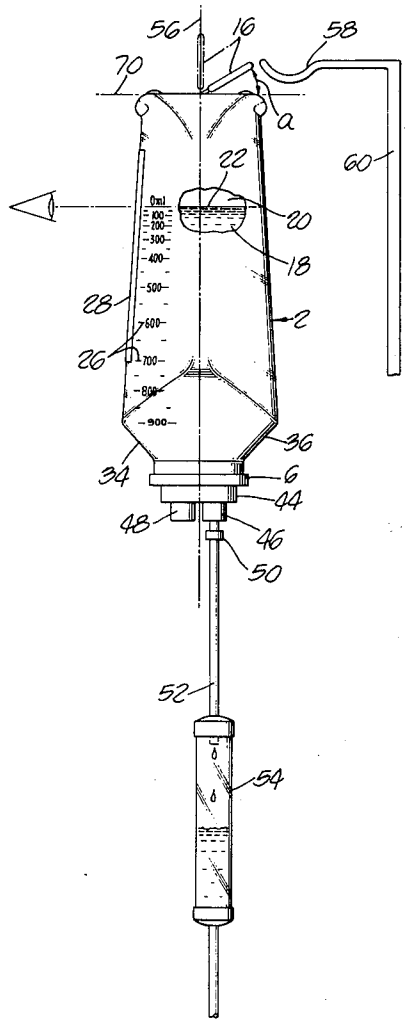
*Attorney, Agent, or Firm*—Larry N. Barger; Robert T. Merrick



[57] **ABSTRACT**

A volumetrically calibrated oval thermoplastic bottle that collapses as it dispenses parenteral liquid to a patient. A front half of the bottle has both volumetric calibrations and a label with the bottle's contents and directions for use. An indented base of the bottle has a hinged thermoplastic hanger and a retention lug that retains the hanger in the recess only when the hanger is folded rearwardly to develop a "rearward set" in the thermoplastic hanger. When the hanger is released from the lug it always angles rearwardly for conveniently hooking onto a hospital stand so that both the calibrations and label are oriented in a forward direction relative to the hospital stand for easy reading as the bottle collapses.


**11 Claims, 4 Drawing Figures**



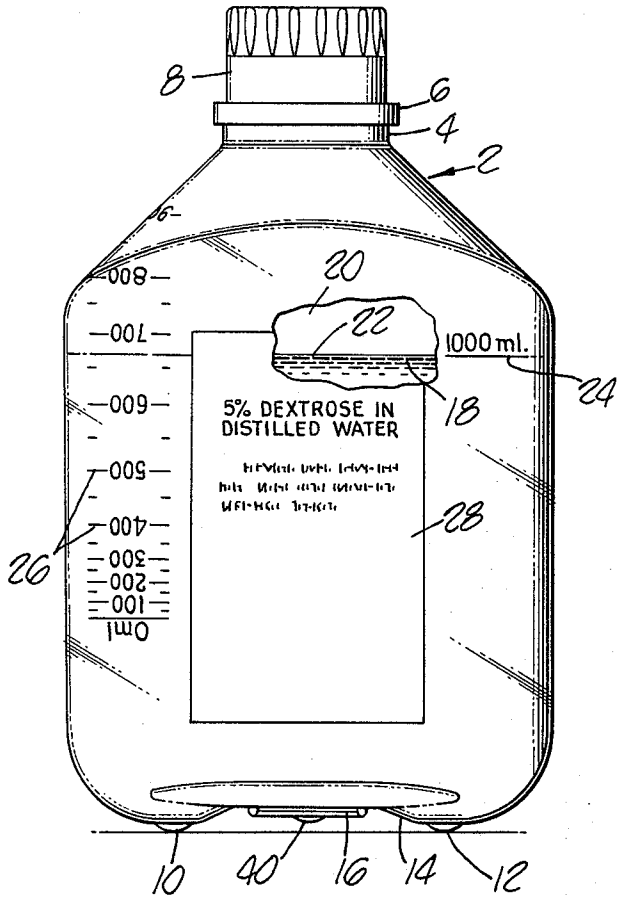

8
6
4
2
20
22
1000 ml.
24
18
5% DEXTROSE IN
DISTILLED WATER
28
26
10
40
16
14
12

FIG. 1.

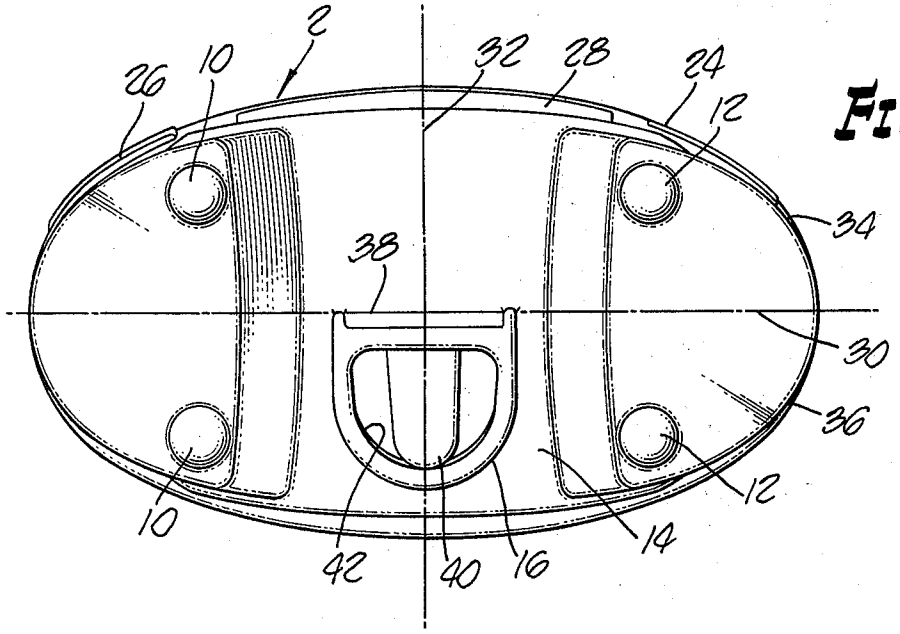

2
26
10
32
28
24
12
34
38
30
36
10
42
40
16
14
12

FIG. 2.

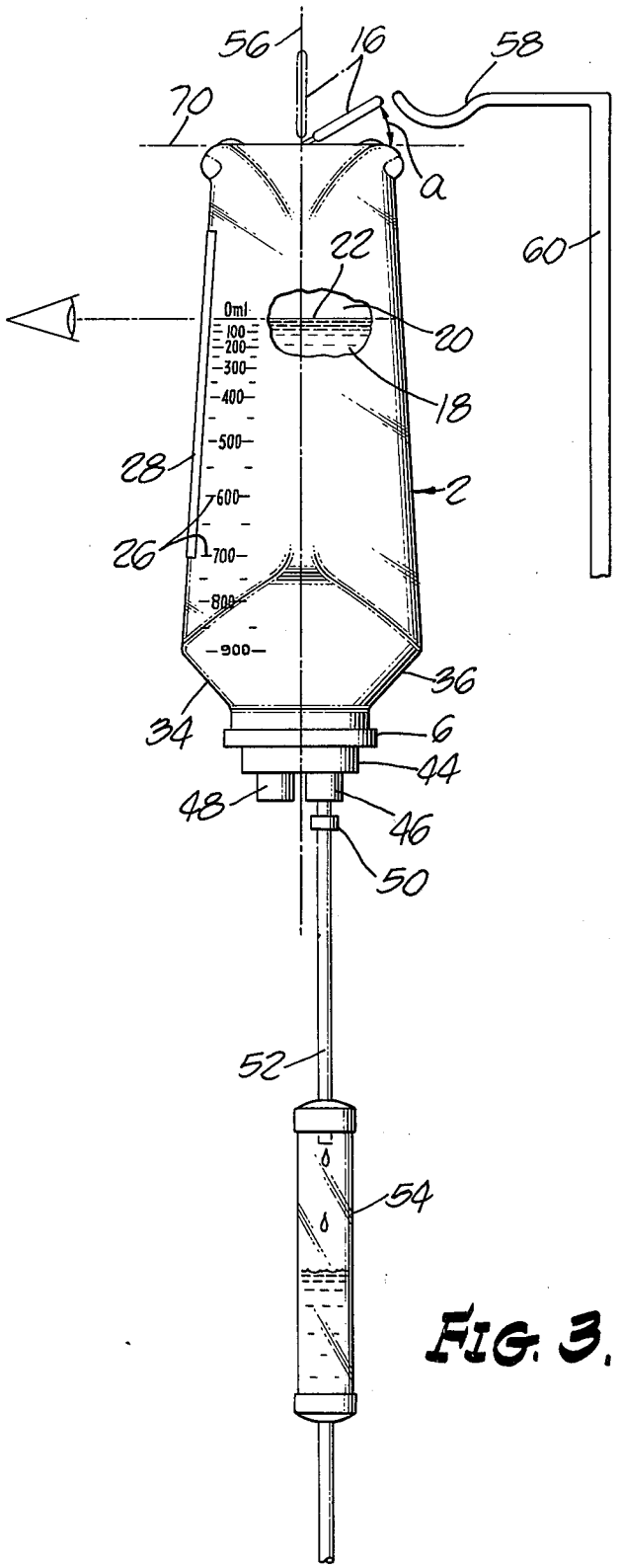

56
16
58
70
a
60
22
0ml
100
200
300
400
500
600
700
800
900
20
18
28
2
26
36
34
6
44
48
46
50
52
54

FIG. 3.

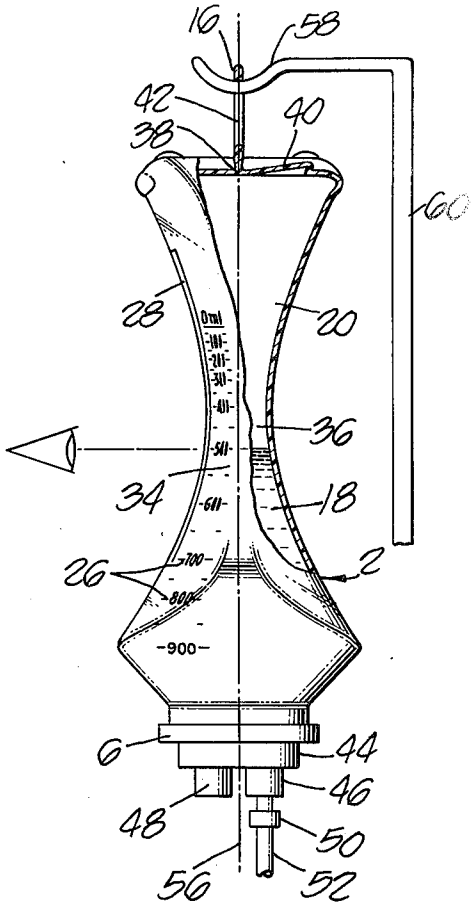

16
58
42
40
38
60
28
0ml
20
36
34
18
26
2
700
800
900
6
44
46
48
50
56
52

FIG. 4.

# COLLAPSIBLE MEDICAL LIQUID BOTTLE WITH CALIBRATION AND LABEL ORIENTING HANGER STRUCTURE

## BACKGROUND

Sterile medical liquid, such as parenteral solution, is commonly infused into a patient's vein from a container hanging above the patient. The sterile liquid flows by gravity through a tubular administration set connected at one end to the container and at an opposite end to the venous needle in the patient.

Sterile parenteral solutions, such as 5% dextrose, normal saline, etc. are frequently supplied to the hospital in sealed sterilized containers. When these containers are of a rigid type such as a cylinderical glass bottle, the volumetric calibrations on the bottle can be accurately read from various angles. This is because the bottle wall and its calibrations maintain a constant shape during the administration of the liquid. In a rigid bottle an air tube or other air inletting system is used to replace the dispensed liquid with air.

Collapsible containers have been proposed that do not require an air-inletting system. Examples of such collapsible containers are flexible bags commonly used to collect and administer blood. Calibrations in a collapsible container cause problems in accuracy because the wall supporting the calibrations is constantly changing shape as liquid is dispensed. Thus, it is important in a collapsible container to have a direct straight line view at the calibrations to minimize any optical distortion caused by the changing shape of the container wall. Medical liquid containers are hung from hospital intravenous (I.V.) stands with the calibrations of the containers facing in many different directions. When the calibrations face rearwardly relative to the I.V. stand, the supporting pole of the I.V. stand can obstruct a direct view of the calibrations. This could cause a distorted angular view of the calibrations, particularly in a collapsible container that continually changes shape.

In a co-pending application I have invented an improved collapsible thermoplastic bottle entitled "Thermoplastic Bottle With 'Controlled Lateral Collapse' and Method of Dispensing Liquid Therefrom," S.N. 445,836, filed Feb. 26, 1974. Such a collapsible bottle does not require an air inletting system to replace the liquid dispensed. With past collapsible containers volumetric accuracy has been a serious problem. Part of this problem has been the bottle orientation when hung from a hospital I.V. stand. Sometimes the nurse would hang the bottle with the calibrations facing rearwardly toward the supporting pole of the I.V. stand. This often occurred where the bottle had a label on one side and the calibrations on an opposite side. Also some hinged hanger systems could be folded either forwardly or rearwardly and retained in a folded condition. Thus, sometimes it depended on how the hanger was folded as to how the nurse would conveniently hang it on a hospital I.V. stand. This caused a randomness in how different bottles were hung from the I.V. stands.

## SUMMARY OF THE INVENTION

To overcome the problem of container orientation explained above this invention provides a unique relationship between the hanger system and the label and calibrations that encourages a nurse to always hang the bottle in a particular orientation. This orientation is such that both the label and volumetric calibrations face outwardly from the supporting pole of an I.V. stand. The oval collapsible bottle of this invention includes a front half that has both a label indicating the contents of the bottle and the directions for use, and this front half also has volumetric calibrations. A base of the bottle includes a recess with an integral hinged thermoplastic hanger and a lug structure that retains the hanger in the recess only when the hanger is hinged rearwardly. Thus after steam sterilization and storage the thermoplastic hanger takes a "rearwardly" extending angle of from 10° to 60° with a base of the bottle. This encourages the nurse to insert a lateral arm of an I.V. stand through the hanger from a rearward direction so that both the calibrations and label are oriented in a forward direction relative to the hospital stand. Since all hangers on Applicant's bottle will have this "rearward set" this encourages a uniformity in how the collapsible plastic bottles are hung from a hospital I.V. stand.



## THE DRAWINGS

FIG. 1 is a front elevational view of the collapsible oval bottle as it is supplied to the hospital;

FIG. 2 is a bottom plan view of the bottle of FIG. 1 showing a hanger folded toward a rear of the bottle and retained in a recess of the bottle by a lug;

FIG. 3 is a side elevational view of the container after it has been connected to an intravenous administration set and the hanger released from the lug; and

FIG. 4 is a side elevational view of the bottle showing its calibrated front wall that changes shape as liquid is dispensed.

## DETAILED DESCRIPTION

Referring to these drawings, FIG. 1 shows the collapsible oval bottle **2** with a tubular neck **4** that has an external flange **6.** Sealed to this flange **6** is an outer cap **8** that fits over an inner closure. The outer cap shown here and the inner closure is explained in more detail in my co-pending application entitled "Three Barrier Closure System for Medical Liquid Container," S.N. 445,834, filed Feb. 26, 1974. Alternatively, the outer cap could be of a form described in a commonly assigned, co-pending application entitled, "Frangible Closure System for Medical Liquid Container and Method of Making Same," S.N. 338,685, filed Mar. 7, 1973 invented by Pradip Choksi. At the base of bottle **2** are a series of supporting feet, two of which are shown as **10** and **12.** At a base of bottle **2** there is also an indented section **14** into which a hinged hanger **16** is confined.

Within bottle **2** there is a sterile medical liquid **18** and a sterile air mass **20.** Between the liquid and air is an innerface **22** that can accurately be measured against calibrations on the bottle. In FIG. **1** there are two sets of calibrations. Calibration **24** is a fill mark. As the bottle is supplied to the hospital, the liquid-air innerface **22** can accurately read within ± 30 ml of the 1,000 ml mark. When the bottle is inverted for dispensing, a separate set of calibrations **26** measure the amount of liquid dispensed. Since the bottle is constantly changing shape as liquid is drained from it, it is important that the calibrations **26** be accurately read by a nurse or physician. It is also important that the label indicating the contents of the bottle be readily visible at all times.

In FIG. **1** a front half of the bottle is shown that contains both an opaque flexible label **28,** showing here the

bottle contains 5% dextrose in water, and the front half also contains calibrations **24** and **26.** As shown in FIGS. **1** and **3** calibrations **24** do not have equal distances between them. This is because the container is thinner at its base than at its shoulder. The differences between the increments of calibrations **26** are more pronounced because of the collapsing wall feature as liquid is dispensed.

The bottom plan view of FIG. **2** shows the oval shape of the bottle. Here a major axis lies along a longitudinal plane **56** that bisects the bottle into a front half **34** and a rear half **36.** A minor axis **32** is perpendicular to the major axis **30** and the oval wall of the bottle collapses inwardly along minor axis **32** as liquid is dispensed.

Located within recess **14** of the bottle's base is a thermoplastic hinged hanger **16** that is integral with the bottle's base. Hanger **16** is connected to the base along a hinged line **38** that lies in a plane **56.** A thermoplastic locking lug **40,** also integral with the bottle's base, extends through an opening **42** in the hanger and retains the hanger in recess **14.** When the bottle of FIG. **1** is received by the hospital it is stored until ready for use. It has been previously steam sterilized by the manufacturer.

At the time volumetric use, the outer cap **8** is removed to expose an inner closure **44** that has a tubular outlet spout **46** and injection site **48** with a puncturable resealable diaphragm. It is important to understand that protrusion **48** shown in the drawings does not represent an air inletting system as in some previous non-collapsing containers. After cap **8** has been removed in spike **50** of a tubular administration set **52,** shown here with a drip chamber **54,** is connected to the tubular outlet spout **46.** A lower end of the administration set **52** is connected to a venous needle (not shown).

After the administration set **52** has been connected, as described above, the container is inverted and hanger **16** snapped out from under lug **40.** The hanger **16** was originally formed in a plane **56** which is perpendicular to a general base plane **70** of the bottle. When released from lug **40** the hanger **16** will spring up from plane **40** because of a "plastic memory" of the hinge hanger **38,** and it will be attempting to return to its originally formed position. The hanger, however, will not return to its straight vertical position in plane **56** as shown in dotted line in FIG. **3** because the thermoplastic hinge **38** has taken a "set" during steam sterilization and storage of the container. After release from lug **40** the hanger **16** forms an angle with base plane **70** that is between 10° and 60°.

With the hanger **16** in an angular position from 10° to 60° as shown in FIG. **3,** the nurse or physician then hooks the hanger onto a supporting arm **58** extending laterally from a support pole **60** of an I.V. stand. The angular position of the hanger extending to the rear of the bottle conveniently orients the label **28** and calibrations **24** and **26** to a position facing forwardly from the I.V. stand. Thus, the relationship between the angular hanger and the label and calibrations provide a consistency of hanging bottles. This provides a clear unobstructed view of the calibrations and label during the administration of the liquid. The rear half of the bottle **36** is completely free of calibrations and any opaque label. During manufacture the contents of the bottle are readily visible through the entire rear half of the bottle.

After the bottle has been connected as shown in FIG. **3** and the dispensing commenced, the bottle begins to change shape as shown in FIG. **4.** The front and rear halves **34, 36** of the bottle concavely flex inwardly as liquid is dispensed. This is because no additional air is added to air mass **20** originally sealed in bottle **2.** As more and more liquid is dispensed, the front wall will continually change shape. However, with a clear unobstructed view the nurse can get an adequate reading to within ± 30 ml over the entire 1,000 ml range of a 1 liter bottle's calibrations **26.** Because of the constantly changing shape of the wall supporting calibrations **26** and flexible label **28** it is important to get a clear view that is unobstructed by pole **60** of the I.V. stand.

In the above invention it has been found that the collapsible bottle works very well when formed of a propylene-ethylene copolymer of the polyallomer type thermoplastic. The calibrations **24** and **26** can be integrally formed in a wall of a blow molded bottle **2.** Alternatively these calibrations could be printed on the bottle with ink. Label **28** can be of paper or thermoplastic-metal foil bonded to the body by an adhesive or other bonding agent. Because of the constantly changing shape of the bottle it is important that label **28** be flexible.

In the above description a specific embodiment has been used to describe this invention. However, it is understood that those skilled in the art can make certain modifications to this embodiment without departing from the spirit and scope of the invention.

I claim:

**1.** In a thermoplastic bottle for sterile medical liquids having an indented base with an integral hinged hanger connected therein, and a lug for holding the hanger in a folded condition within the recess, the improvement of: a generally oval collapsible thermoplastic bottle with a longitudinal major axial plane bisecting the bottle into front and rear halves; a label indicating the bottle's contents, and volumetric calibrations, both of which are connected to a front half of the bottle that changes shape as liquid is dispensed from the bottle; and a retention lug system that retains the hanger in the recess when the hanger is folded rearwardly but not when the hanger is folded forwardly, whereby sterilization and storage of the hanger is such rearwardly folded condition causes the hanger to take an angular set in a direction facing rearwardly from both the label and the calibrations.

**2.** The combination as set forth in claim **1** wherein the hanger has an opening therethrough for connecting with a lateral arm of an intravenous support stand, and the lug is in integral protrusion from the container base that fits within this opening.

**3.** The combination as set forth in claim **1** wherein the hanger is hingedly connected to the bottle in a recess along a hinged line lying in the major longitudinal bisecting plane.

**4.** The combination as set forth in claim **1** wherein the bottle has a base with a transverse base plane approximately perpendicular to the longitudinal bisecting plane, and the hanger is hinged within the recess so the hanger is approximately parallel to the transverse base plane.

**5.** The combination as set forth in claim **4** wherein release of the hanger from the retention lug causes the hanger to automatically form an angle between 10° and 60° with the transverse base plane.

6. The combination as set forth in claim 5 wherein the hanger was formed at approximately 90° to the transverse base plane of the bottle.

7. The combination as set forth in claim 1 wherein the label is flexible and opaque.

8. The combination as set forth in claim 1 wherein the label is located in a center portion of the front half of the bottle and there is a first set of calibrations on one side of said label and a second set of calibrations on an opposite side of said label.

9. The combination as set forth in claim 8 wherein the first set of calibrations gives an indication of the full liquid contents when the bottle is standing upright on its base.

10. The combination as set forth in claim 8 wherein the second set of calibrations give a volume reading of liquid dispensed when the bottle is hung upside down from its hinged hanger.

11. In a thermoplastic bottle containing a sterile medical liquid and including an indented base having an integral hinged hanger secured within said recess, the improvement of: a thermoplastic bottle having a generally oval collapsible wall that continually changes shape as liquid is dispensed therefrom; a sterile medical liquid sealed within the thermoplastic bottle; a sterile air mass sealed within the thermoplastic bottle; a dispensing outlet on the thermoplastic bottle; a tubular administration set connected to the dispensing outlet; an injection site with a puncturable resealable diaphragm for injecting added medication into said bottle; said bottle having a generally oval shape with a transverse major axis that extends through a longitudinal plane bisecting the bottle into a front half and a rear half; said bottle having a minor plane perpendicular to the major plane along which said oval wall collapses as liquid is dispensed; an opaque label indicating the bottle's contents and directions for use secured to a central portion of a front half of the bottle; a first columetric calibration at one side of the label indicating a fill mark when the bottle is standing upright on its base; a second set of volumetric calibrations extending vertically along the bottle's front half at an opposite side of the opaque label, said second set of calibrations indicating the volume of liquid dispensed when the bottle is hung in an outlet downward position; a hinged hanger having a flexible hinge connected to the base along a hinge line lying within the major longitudinal bisecting plane, said hanger being formed within this plane and having an opening therethrough; a retention lug integrally formed with the bottle in its indented recess area, said retention lug being positioned entirely on a rear half of the container so that the lug engages and retains the hanger within the recess only when folded rearwardly and not when the hanger is folded forwardly, said hanger being maintained in a hinged position within the indented recess along a base plane that is approximately perpendicular to the longitudinal major bisecting plane; and said hanger having a hinge that has been preconditioned to form an angle between 10° and 60° with said base plane when released from said retaining lug, whereby the angularly disposed hanger orients the calibrations and label in a direction facing outwardly from an intravenous support stand when the hanger is connected to such stand.

* * * * *